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(54) SYNTHESIS OF DIAMOND

(57) Abstract:

PURPOSE: To obtain stable diamond having a large mean grain size in vapor phase at high crystallization velocity and with high efficiency without requiring seed crystal nor substrate by generating plasma by causing electric discharge in a starting gas consisting of gaseous CO and/or CO₂, gaseous H₂, and inert gas.

CONSTITUTION: (A) Reaction gas consisting of CO and/or CO₂ as starting gas is introduced from an introducing port 1 of reaction gas, (B) sheath gas consisting of purified gaseous H₂ is introduced from an introducing port 3 for the sheath gas, together with carrier gas consisting of inert gas, and (C) plasma gas consisting of inert gas such as Ar, etc., is introduced from an introducing port 2 of plasma gas, wherein each flow rate and proportion of mixing of each component are regulated to 0.5W50liter/min for A, 5W30liter/min for B, 0.5W50 liter/min for C, and 0.01W0.99 volume ratio of A/B. Electric discharge is caused in the reaction pipe 4 into which the starting material gas is introduced by

means of an electric power source 5 and a coil 6, and high temp. plasma 10a is generated at $\geq 1000\text{K}$ gas temp., $\geq 1\text{kw}$ output, and $>2\text{kVA}$ plate output. Thus, diamond having $\geq 100\text{\AA}$ mean grain size is obtd. on a receiving dish 20 under $1\text{W}10000\text{Torr}$ reaction pressure.

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